B8 cancel

for the SiON layer deposited by the plasma enhanced CVD method is about 620 Å. It should be noted that, for comparison purposes, n = 1.46 and k = 0 for a pure SiO_2 layer, while n = 2~2.1 and k = 0.3 for a pure Si_3N_4 layer.

In The Claims

Claim 1 has been amended as follows:

B9 Sub C1

1. (Amended) A method for adjusting the optical properties of an anti-reflective coating (ARC) layer comprising the steps of:

providing a preprocessed semiconductor substrate having a SiN_x or a polysilicon layer on a top surface;

depositing a dielectric ARC layer on said SiN_x or said polysilicon layer; and

annealing said dielectric ARC layer deposited on said semiconductor substrate at a temperature of at least 500°C and in a gas comprising at least one element selected from the group consisting of N_2 and O_2.

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Claim 11 has been amended as follows:

11. (Amended) A method for adjusting the optical properties of an anti-reflective coating layer according to claim 1 further comprising the step of annealing said dielectric anti-reflective coating layer for a time period between about 3 min. and about 5 min.

Claim 13 has been amended as follows:

13. (Amended) A method for adjusting the extinction coefficient (k) of a dielectric anti-reflective coating layer by the steps of:

providing a SiN_x or polysilicon layer covered semiconductor substrate;

depositing a dielectric anti-reflective coating layer of a material selected from the group consisting of SiO_2, SiON and SiONH on top of said SiN_x or said polysilicon layer; and

heating said semiconductor substrate to a temperature between about 500°C and about 1,000°C in an environment that comprises at least one of N_2 or O_2.

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Claim 14 has been amended as follows:

14. (Amended) A method for adjusting the extinction coefficient (k) of a dielectric anti-reflective coating layer according to claim 13 further comprising the step of heating said semiconductor substrate for a length of time sufficient to vary the extinction coefficient of said dielectric anti-reflective coating layer by at least 10%.

Claim 17 has been amended as follows:

17. (Amended) A method for adjusting the extinction coefficient (k) of a dielectric anti-reflective coating layer according to claim 13 further comprising the step of heating said semiconductor substrate to a temperature between 500°C and 700°C in an environment of O_2.

In The Abstract

A method for adjusting the optical properties of an anti-reflective coating layer by thermal annealing is described. In the method, a dielectric ARC layer of SiON is first deposited by plasma enhanced CVD to a thickness of at least 500 Å. The dielectric ARC layer is deposited on a silicon nitride layer or on a polysilicon layer which can withstand the annealing temperature used for the dielectric ARC layer.

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